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Three subjects were submitted to 6 series of tilt table experiments in an air-conditioned room adjusted to induce vasomotor responses ranging from sweating to shivering states. The rate of increase of venous pressure in the foot after tilting from the horizontal to upright posture depended upon the degree of vasodilation. When hot the pressure attained 80% of the full potential value of approximately 100 mm. Hg in less than 20 seconds; when comfortable, this required 90 seconds and, when cool, 3 minutes after tilting the pressure was still less than 50% of the full value. Tests during quiet standing showed that normal postural activity reduced the mean venous pressure when cool and when comfortable to approximately 55 and 65 mm. Hg, respectively. When sweating, these movements were insufficient to sustain a low pressure and the mean level became 90 mm. Hg. This pressure exceeds by 30 mm. Hg any probable counter-balancing combination of osmotic and tissue pressures. The rhythmic inflation of counter-pressure clothing (anti-g suits) can be substituted for the massaging effect of the muscles on the vessels. Thus during standing-walking, when hot, the mean pressure in 9 subjects was 67% and when cool, 41% of the resting value. When seated and using the suit, the corresponding values were 72% and 47%. It is suggested that such clothing might be employed to aid circulation in the lower extremities in certain clinical conditions.

Maximal oxygen intake and renal plasma flow in patients with aortic insufficiency. AUSTIN HENSCHEL, THOMAS B. GIBBONS* AND CARLETON B. CHAPMAN.* *Lab. of Physiological Hygiene, Univ. of Minnesota, Minneapolis.*

The maximal oxygen intake and renal plasma flow were measured in 8 normal young men and 7 male patients of similar age, physique and exercise habits, who had mild to moderate aortic insufficiency due to rheumatic fever. Renal plasma flow was measured using a constant injection of para-aminohippurate at rest, during two 16-minute periods of walking at 3 miles per hour on a 10% grade, and at supine rest for 40 minutes following the work. Maximal oxygen intake was determined from 1 minute 45 seconds to 2 minutes 45 seconds of a 3-minute run at 6 miles per hour on a grade adjusted to the performance capacity of each subject. The maximal oxygen intake was 44.03 cc/kg/min. and 37.43 cc/kg/min. for the normal and cardiac subjects, respectively. The 15% difference in maximal oxygen intake for the 2 groups of subjects is statistically highly significant. The mean resting renal plasma flow corrected to 1.73 sq. meters of body surface was 495 and 576 cc/min. in the patients and normal subjects, respectively; the difference is statistically significant. During exercise the renal plasma flow was decreased by 25% of the resting value for each group. Forty minutes after the cessation of the exercise the renal plasma flow had returned to the pre-exercise resting level in most of the normal and cardiac subjects.

Dielectric properties of tissues important in microwave diathermy. J. F. HERRICK, D. G. JELATIS* AND G. M. LEE.* *Mayo Foundation, Rochester, Minn.*

Microwave diathermy has become an integral part of medical diathermy since it was approved by the Council of Physical Medicine and Rehabilitation of the American Medical Association. This relatively new type of diathermy has proven to be an efficient method for heating certain localized areas of the body. The ultimate objective in studying the dielectric properties of animal tissues was to understand the heating of these tissues by microwaves. We wished to explain, if possible, the experimentally observed temperature distribution produced in the tissues by microwaves. The amount of heat developed in biological tissues by microwave diathermy is dependent on the dielectric properties of the tissues. Since these properties vary with frequency, it is desirable to measure them at the actual frequencies used for microwave diathermy. Observed values are presented for the dielectric constant and loss of freshly excised samples of such tissues as liver, muscle, fat, bone and bone marrow. The dielectric properties of certain body fluids will also be presented. The design of a 'transformer' for increasing the transfer of microwave power into a particular tissue such as muscle is given as an example of the utility of the dielectric data. The equipment used for measuring dielectric constant and loss was the microwave dielectrometer which was designed and constructed by one of us.

Simultaneous partitional calorimetry and estimation of blood flows in main skin regions of the body. ALRICK B. HERTZMAN AND WALTER C. RANDALL. *Dept. of Physiology, St. Louis. Univ. School of Medicine, St. Louis, Mo.*

Cutaneous evaporative, radiative and convective heat losses and blood flows were estimated repeatedly and approximately simultaneously in the forehead, cheek, chest, abdomen, arm, forearm, thigh, calf, hand and foot of nude subjects in the operative temperature range of 27–37°C. over an observational period of 4 hours. Although each region exhibited variations in the rate of heat loss during an observational period, comparison of the mean values for the total 4-hour heat loss from each region indicates a tendency towards

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